35 Cncl'd.

38. (New) The device according to claim 22, wherein the resistivity is in a range of about 1 Ω cm and about 500 Ω m.

REMARKS

This Amendment is in response to the Office Action of November 29, 2001, in which the Examiner made certain technical objections to the specification, drawing and claims. In this regard, claim 8 has been labeled "Prior Art." The Abstract, as required by the Examiner, has been provided on a separate sheet and claims 5, 12 and 32 have been amended in order to properly recite the claimed ranges. In this regard, new claims 37 and 38 have been provided to cover the additional ranges set forth in claim 22.

The Examiner rejected certain claims under 35 U.S.C. § 103(a) as being unpatentable over Enoksen (U.S. Patent No. 4,041,431) in view of Elton (U.S. Patent No. 5,036,165). According to the Examiner, Enoksen discloses an electromagnetic device having a control device and a control winding. However, Enoksen does not disclose that at least one winding or part thereof comprises a conductor with a particular insulation system.

Certain claims are rejected over Enoksen in view of Elton and further in view of Olsson (U.S. Patent No. 5,084,663). The Examiner asserts that Olsson discloses a material, *i.e.*, air having a permeability greater than 1.

Certain claims are rejected over Enoksen and Elton and further in view of Flick (U.S. Patent No. 4,164,672. According to the Examiner, Flick discloses that the magnetic circuit is without a magnetic core.

Certain claims are rejected over Enoksen in view of Elton and further in view of Penczynski (U.S. Patent No. 3,959,549). The Examiner asserts that Penczynski discloses a device with inner and outer layers and a solid insulation with equal thermal properties.

Certain claims were rejected over Enoksen in view of Elton and further in view of Breitenbach. The Examiner asserts that Breitenbach discloses that the inner and outer layers and solid insulation are rigidly connected to each other over substantially the entire interface to ensure adherence.

The Examiner's rejection of the claims is respectfully traversed for the reasons set forth below.

Enoksen discloses a conventional voltage compensated transformer power regulator. However, the arrangement of Enoksen is not adapted for the high voltage operation contemplated in the present invention. Indeed, Enoksen discusses the disadvantages of transformers operating in a 2,000 watt power range. Enoksen describes and discusses various low voltage transformers in col. 8 beginning at about line 60 through col. 9, through line 48. The described transformers operate at less than 150 volts. The present invention is adapted to operate at tens of kilovolts and higher. The relatively low power transformer of Enoksen operates in a totally different environment than the devices contemplated according to the present invention. Indeed, conventional high power transformers have windings which are insulated with impregnated paper and wherein the winding is immersed in an insulating and cooling fluid within a vessel in order to contain the electric field.

It is believed that one of ordinary skill in the art would not simply adapt the arrangement of Enoksen for operation at higher voltages because there is no suggestion that simply raising the voltage would be useful for such purpose or result in an operative device at high voltage levels. Further, it is recognized in the art that low power transformers and low power machines do not scale up without significant modifications, some of which are impractical. Accordingly, it is believed that the Enoksen reference is an inappropriate reference for modification by the various secondary references.

In this connection, the Examiner asserts that it would have been obvious to employ the insulating arrangement of Elton in the Enoksen device. The substitution suggested by the Examiner would be inoperable and impractical for a variety of reasons. However, before addressing those shortcomings, it should be noted that one of ordinary skill in the art would not employ a transmission and distribution cable as a winding in a high voltage transformer in the first instance. The cable disclosed in Enkel '165 is a power transmission cable. It is not a winding in a transformer. If one studies the Elton '165 reference carefully, one realizes that it is a division of an earlier application, U.S. Patent No. 4,853,565, in which an insulation system for a winding of a conventional low voltage high current rotating electric machine is disclosed along with an insulation system for a transmission cable and an insulation system for a shielded electronic component housing. These three examples in Elton '565 only one of which is featured in Elton '165 are merely examples of how a pyrolyzed glass tape might be employed to provide insulation in a variety of devices. However, Elton '165 and 565 do not disclose that it would be useful to employ the cable in Elton as the winding of a rotating machine or in a transformer. Indeed, the arrangement in Elton is quite rigid when cured and if the cable disclosed in Elton '165 would be employed as a winding, it would crack when bent because the pyrolyzed glass layer is brittle and is not bendable to any great extent. Such cracking would cause the production of corona discharge sites which could cause the winding to fail.

It is therefore believed that the combination suggested by the Examiner would not function and one of ordinary skill in the art would not be persuaded to employ the cable of Elton as a winding in any kind of electric machine.

The Examiner's rejection of certain claims over Enoksen, Elton et al. and further in view of Olssen '663 is likewise believed to be inappropriate for the reasons set forth above and

further because Olssen is simply a device which has a detector in the assembly of a stator pole which generates a signal indicative of the proximity of the rotor pole and the voltage in the winding is controlled in order to control the operation of the machine. The arrangement in Olssen is adapted for use in a low voltage machine adapted for use in an appliance such as a vacuum cleaner. These machines are conventional in every way including the voltage level at which they operate. The present invention is adapted for high voltage operation.

The arrangement of Olssen, wherein the voltage in the winding is controlled by an electronic circuit, is totally inappropriate for use in a high voltage machine. It is precisely because the motors of the type described in Olssen are low voltage that these types of controls have been adapted in the past. However, it is unlikely that one of ordinary skill in the art of high voltage machines would look to Olssen for a control scheme for such a machine. Further, as noted above, it would be inappropriate for one of ordinary skill in the art to apply teachings which are adapted for low voltage operations in relatively low power or even fractional horsepower motors and machines for operation at high power as contemplated in the present invention.

Certain claims are rejected over Enoksen and Elton as noted above and further in view of Flick '672. According to the Examiner, Flick discloses a magnetic circuit without a magnetic core. Flick allegedly operates at the line or power network voltage. The arrangement of Flick is directed to a cooling and insulating system for an allegedly high voltage machine which employs oil for cooling and insulation. The arrangement is totally inapplicable to the present invention. Flick employs an arrangement where the phase coils of the armature winding are arrayed in outwardly spiraling paths about the rotor. Smooth and continuous interphase spaces are formed between the coils for containing interphase insulating layers comprising laminated sheets of permeable material impregnated with a dielectric liquid.

Spaces within the layers contain dielectric liquid which is circulated for cooling the winding. Intracoil insulation between the layers in comprised of laminated sheets of permeable material impregnated with a dielectric liquid. The arrangement in Flick does not employ a cable with a high voltage insulation in the form of an inner semiconducting layer, a solid insulation layer and an outer semiconducting layer.

Whether Flick is operable or practical is a matter of conjecture. However, even if Flick were operable, Applicants do not understand how one of ordinary skill in the art would apply the teachings of Enoksen to achieve the desired result. If Flick is operable, it operates in a totally different way than the present invention. The mere recitation of the desirability to achieve a function does not mean that function would be achievable simply by combining references which recite such a desirability without demonstrating that there is a possibility of producing an operable device using the structures disclosed in the combined references. It is believed that one of ordinary skill in the art would not expect to achieve an operable result.

With respect to the claims which are rejected over Enoksen and Elton et al. and further in view of Penczynski '549. The arrangement in Penczynski is for a superconducting three phase cable, that is, a cable for carrying three phase power. It is not adapted as a winding in an electric machine. Indeed, cables are generally adapted for use in an open configuration, that is, in ambient air and not in the confined environment of an electric machine. The arrangement in Penczynski is to provide elasticity when the cable is cooled to a very low temperature to equalize expansion differences which occur in the cable at such temperatures. Normally, the expansion and contraction of cable is of minimal importance. However, in Penczynski, it is important because the cable is cooled down to very low temperatures. Further, it is not understood how the arrangement of Penczynski would be useful in the winding of an electric machine inasmuch as the outer covering must have specific properties in order to operate.

Penczynski is simply concerned with insulating the outer layer of the cable, but it is not interested in any of the electrical properties associated with the operation of a machine which must be performed simultaneously with the operation as an insulator. If the arrangement of Penczynski would be substituted in the winding of the invention, then the arrangement would not operate as desired. One cannot simply substitute elements from a power cable, for example, to a machine without careful consideration of what effect the substitution would have on the device in question. Merely because the devices cited by the Examiner are cables or machines or transformers does not mean that the particular components are interchangeable. Further, even if the arrangement of Penczynski were substituted as suggested by the Examiner, the improved elasticity would not compensate for the loss of electrical function associated with the substitution.

With respect to the rejection of the claims over Enoksen in view of Elton and Breitenbach '138, similar arguments can be made. The arrangement in Breitenbach is a cable arrangement having an outer conductive layer which is employed as the winding of a linear motor. The cable of Breitenbach would not be operable in a machine according to the present invention. For example, in a rotating machine and in a high power transformer, heat would be produced as a result of the changing magnetic fields and the eddy current flows which occur in a confined area, whereas in Breitenbach, the arrangement is essentially in open air and is cooled by ambient. While it is intended that Breitenbach be sufficiently flexible so that it can be mounted in the structure of the linear motor, such mechanical flexibility is not necessarily related to the thermostresses which could occur as a result of operating at higher temperatures. Further, the substitution of the arrangement of Breitenbach to render the cable flexible would not render it operable under the constraints of the requirements of the present invention.

The amended claims are believed to better clarify the structure of the invention employing a cable as a winding for an electric machine. The cable comprises a conductive cable surrounded by an inner layer of semiconducting material, an intermediate layer of solid insulation and an outer layer of semiconducting material which in effect confine the electric field to within the cable and allow operation at high voltages without liquid coolant or insulation. These features are not shown or suggested by the references cited by the Examiner. Such a determination is earnestly solicited.

In view of the foregoing, it is therefore respectfully requested that the Examiner reconsider the rejection of the claims, the allowance of which is earnestly solicited.

If filing this paper or any accompanying papers necessitates additional fees not otherwise provided for, the undersigned authorizes the Commissioner to deduct such additional fees from Deposit Account No. 04-2223.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 1. (Twice Amended) [Electromagnetic] An electromagnetic device comprising at least one magnetic circuit and at least one electric circuit [comprising] including at least one winding, the magnetic and electric circuits being inductively connected to each other and the device [comprising] employing a control arrangement to control operation of the device, wherein the control arrangement is adapted to control at least one of frequency, amplitude and[/or] phase [as concerns] of electric power [to/from] to and from the device, [by] the control arrangement comprising means for controlling the magnetic flux in the magnetic circuit, and [that said] at least a portion of said at least one winding [or at least a part thereof] comprises at least one electric conductor in the form of a cable including an insulating covering including an inner layer having semiconducting properties surrounding the conductor, [having an insulation system comprising an electric insulation formed by] a solid insulation material [and interiorly thereof an] surrounding the inner layer [said at least one electric conductor is arranged interiorly of] and an outer layer having semiconducting properties surrounding the [inner] solid insulation layer and [that] wherein the conductor produces an electric field when energized and the inner layer has an electrical conductivity which is lower than the conductivity of the electric conductor but sufficient to cause the inner layer to [operate for equalization as concerns] equalize the electrical field exteriorly of the inner layer.

Claim 3. (Twice Amended) The device according to claim 1, wherein the magnetic circuit has a controller and the control arrangement is adapted to control the reluctance in the magnetic circuit.

Claim 4. (Twice Amended) The device according to claim 1, wherein the control arrangement is adapted to add a magnetic flux in addition to the magnetic flux in the magnetic circuit.

Claim 5. (Twice Amended) The device according to claim 3, wherein a material having a permeability greater than 1 is included in one or more zones of the magnetic circuit and [that] the control arrangement is adapted to control the reluctance in the magnetic circuit by varying the permeability of said one or more such zones [of the magnetic circuit which have variable permeability].

Claim 6. (Twice Amended) The device according to claim 5, wherein the [zone] one or more zones having a variable permeability comprise one or more gaps in the magnetic circuit.

Claim 22. (Twice Amended) The device according to claim 1, wherein the inner layer and[/or] the outer layer [has] have a resistivity in [the] a range of about 10^{-6} Ω cm [-] and about 100 k Ω cm[, suitably 10^{-3} Ω cm, preferably 1- 500 Ω cm].

Claim 23. (Twice Amended) The device according to claim 1, wherein the inner layer and/or the outer layer has a resistance which per length meter of the conductor/insulation system is in [the] a range of about 50 μΩ [-] and about 5 M Ω.

Claim 32. (Twice Amended) The device according to claim 1, wherein the conductor

and its insulation system is designed for high voltage, suitably in excess of <u>about</u> 10kV[, in particular in excess of 36 kV and preferably more than 72,5 kV].